

Mimetic Finite Differences and Interpolation Methods to Simulate Subsurface Mass Transport of Injected CO₂

Eduardo Sanchez¹ and Jose Castillo¹

¹San Diego State University

Abstract

Previous work by the authors introduced algorithms to create higher-order mimetic gradient, divergent, and Laplacian operators that can also be used to construct their higher-dimensional counterparts. These operators have been successfully used to solve subsurface diffusive mass transport problems. However, in order for us to be able to account for the effects of advective transport due to an existing seepage velocity field, we must perform an interpolation on the concentration field, in order to compute its advective contribution. We explore the construction of mimetic interpolation operators, and their role in the solution of higher-dimensional, higher-order mimetic subsurface mass transport problems. We also explain the integration of these interpolation schemes into the Mimetic Methods Toolkit (MTK), a C++ software library for mimetic numerical methods.